

10102

# **FINAL DESIGN REPORT LAGOON CLOSURE REMOVAL ACTION**

**Commercial Oil Services Site  
Oregon, Ohio**

**EPA Region 5 Records Ctr.**



**207090**

**JANUARY 1997**

**REF. NO. 5649 (11)**

This report is printed on recycled paper.

**CONESTOGA-ROVERS & ASSOCIATES**

## TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 BACKGROUND INFORMATION.....	1
1.1.1 Site Description.....	1
1.1.2 Site History.....	2
1.2 PURPOSE AND SCOPE OF REMOVAL ACTION.....	4
2.0 DESIGN BASIS.....	7
3.0 LANDFILL CONSTRUCTION.....	10
3.1 LANDFILL DESIGN COMPONENTS.....	10
3.1.1 Clay Test Pad Construction.....	11
3.1.2 Landfill Base Preparation.....	11
3.1.3 Clay Liner System.....	12
3.1.4 Leachate Collection System.....	13
3.1.5 Cap System.....	15
3.1.5.1 Clay Barrier Layer.....	15
3.1.5.2 Flexible Membrane Liner.....	15
3.1.5.3 Granular Drainage Layer.....	16
3.1.5.4 Geotextile Filter Fabric.....	17
3.1.5.5 Common Fill Layer.....	17
3.1.5.6 Topsoil Layer.....	17
3.1.5.7 Vegetative Cover.....	18
3.1.5.8 Backfilling Lagoons.....	18
3.1.5.9 Site Restoration.....	18
3.2 SURFACE WATER RUNOFF.....	18
3.3 SUPPORTING FACILITIES.....	19
3.4 MISCELLANEOUS LANDFILL SITE OPERATIONS.....	20
3.4.1 Site Security.....	20
3.4.2 Site Access Roads.....	20
3.4.3 Landfill Development Plan.....	20
3.4.4 Sediment and Erosion Control Plan.....	22
3.4.5 Record Keeping.....	24
3.5 HEALTH AND SAFETY.....	24
4.0 SLUDGE STABILIZATION/SOLIDIFICATION.....	25
4.1 SLUDGE STABILIZATION/ SOLIDIFICATION OBJECTIVES.....	25
4.2 PRE-DESIGN STUDY RESULTS.....	25
4.3 SLUDGE STABILIZATION/SOLIDIFICATION DESIGN.....	26

## TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
5.0 SOIL EXCAVATION .....	28
5.1 SOIL CLEANUP GOALS .....	28
5.2 CONTAMINATED SOIL REMOVAL PROCEDURES .....	29
6.0 WASTEWATER TREATMENT FACILITIES .....	31
6.1 WASTEWATER CHARACTERISTICS .....	31
6.2 DESIGN FLOWS.....	31
6.3 TARGET CONSTITUENTS.....	32
6.4 TREATMENT SYSTEM COMPONENTS .....	33
6.4.1 Treatment Trains .....	33
6.5 EFFLUENT DISCHARGE .....	33
7.0 CONSTRUCTION SUPPORT FACILITIES .....	34
7.1 SITE OFFICES .....	34
7.2 EMERGENCY FIRST AID FACILITIES .....	34
7.3 FIRE FIGHTING EQUIPMENT.....	34
7.4 DECONTAMINATION FACILITIES.....	34
7.5 PERSONNEL HYGIENE/DECONTAMINATION FACILITY .....	35
7.6 PORTABLE SANITARY FACILITIES .....	35
7.7 UTILITIES.....	35
7.8 SITE COMMUNICATIONS.....	35
7.9 ACCESS ROADS .....	36
7.10 PARKING .....	36
8.0 MONITORING .....	37
8.1 AIR MONITORING.....	37
8.2 GROUNDWATER MONITORING WELLS.....	38
8.3 GROUNDWATER SAMPLING .....	40
8.4 LEACHATE MONITORING .....	41
8.5 METEOROLOGICAL MONITORING.....	41
9.0 SOIL VOLUMES.....	42
10.0 TRANSPORTATION PLAN.....	43
11.0 SEDIMENT AND EROSION CONTROL PLAN.....	45

## TABLE OF CONTENTS (CONT'D)

	<u>Page</u>
12.0 OPERATION AND MAINTENANCE.....	47
13.0 ADMINISTRATIVE TASKS.....	48
13.1 ACCESS AGREEMENTS.....	48
13.2 SUBSTANTIVE REQUIREMENTS.....	48
13.3 RECORD KEEPING AND REPORTING.....	48
14.0 PROJECT SCHEDULE.....	49
15.0 COMMUNITY RELATIONS.....	50

## LIST OF FIGURES

FIGURE 1.1	SITE LOCATION.....	Following Text
FIGURE 1.2	EXISTING CONDITIONS.....	Following Text
FIGURE 3.1	LANDFILL GEOTECHNICAL BORINGS.....	Following Text
FIGURE 5.1	PRELIMINARY DELINEATION OF ASSESSMENT AREAS .....	Following Text
FIGURE 6.1	CURRENT SLUDGE DEWATERING AND TREATMENT SYSTEM.....	Following Text
FIGURE 8.1	MONITORING WELL LOCATIONS.....	Following Text
FIGURE 8.2	TYPICAL SHALLOW MONITORING WELL WITH LOCKING CAP .....	Following Text
FIGURE 15.1	PROJECTED CONSTRUCTION SCHEDULE.....	Following Text

## LIST OF TABLES

TABLE 4.1	LAGOON SLUDGE STABILIZATION CHARACTERISTICS.....	Following Text
TABLE 5.1	PRE-FINAL REMEDIATION GOALS FOR COCS .....	Following Text
TABLE 6.1	WATER TREATMENT SYSTEM DISCHARGE CRITERIA .....	Following Text

## LIST OF APPENDICES

APPENDIX A	DESIGN CALCULATIONS
APPENDIX B	SCOPE OF WORK CONTRACTOR TREATABILITY STUDY

#### 4.0 SLUDGE STABILIZATION/SOLIDIFICATION

The oil sludges at the COS Site are characterized by high liquid content and low strength. This section presents the sludge S/S design, the Pre-Design Study results, objectives and a discussion of the proposed design.

##### 4.1 SLUDGE STABILIZATION/ SOLIDIFICATION OBJECTIVES

The objectives of the sludge S/S as stated in the RAWP are to:

- Reduce the water content in the sludge/sediment such that the material will pass a paint filter test (SW-846 Method 9095);
- Provide sufficient stabilization to ensure that the treated sludge will pass the TCLP test for applicable parameters;
- Improve handling characteristics to allow placement and compaction in the landfill using conventional construction equipment; and
- Improve the strength characteristics of the material to provide a structurally stable landfill.

##### 4.2 PRE-DESIGN STUDY RESULTS

The volume, weight, moisture content and recommended solidification procedure for the lagoon sludges were established in the May 8, 1992, Solidification/Stabilization Treatability Study. This study established that the use of a formulation of Lime Kiln Dust (LKD) and Portland Cement (PC) mixed at a ratio of 3:1 when added to the sludge at an appropriate ratio would stabilize the lagoon sludge. When the LKD/PC reagent was mixed with the sludge at the ratios shown in Table 4.1, an unconfined bearing capacity of at least 1.5 tons per square foot resulted.

According to the Treatability Study, at the above cited rate of reagent addition, the total volume of the sludge is anticipated to increase by approximately 38% when treated. Therefore, total volume of material will increase from the 77,000 cubic yards of untreated sludge estimated in the RAWP to 106,300 cubic yards of solidified/stabilized sludge.

#### 4.3 SLUDGE STABILIZATION/SOLIDIFICATION DESIGN

Based upon the pre-design test results, mix design(s) expected to be capable of achieving the stabilization/solidification objectives for the sludges have been determined. In order to allow the potential use of innovative Contractor-specific equipment and materials, the bidding Contractors will be required to perform tests on samples of sludges. The Contractor will be required to provide adequate documentation and test results to support the Contractors-proposed mix designs.

The scope of work for the Contractor's treatability study is presented in Appendix B.

The test results for the Contractor's treatability study will include the following information:

- TCLP testing;
- Determination of optimum moisture content/compaction testing [Standard Proctor Density (SPD)] on the treated materials prior to landfilling;
- Unconfined compressive strength testing prior to landfilling and at 28 days on sample compacted to 90% SPD. "Prior to landfilling" indicates the time at which the Contractor intends to place the material in the landfill and the material has cured sufficiently to meet all criteria;
- Shear testing of compacted material;
- Density of compacted material;

- Paint filter testing prior to landfilling and liquid release testing prior to landfilling and at 28 days;
- Consolidation testing; and
- Material bearing strength [determined by California Bearing Ratio (CBR) test] when wet (i.e., to determine workability following precipitation events).

The Contractor's Sludge Stabilization Plan and Excavation Plan will be submitted to USEPA for review.

The initial stabilization effort at each lagoon will be treated as a pilot scale test area. This will ensure that material blending methods and reagents are adequate to meet the performance objectives. USEPA will be notified prior to work commencing at each source location.